IPRL Offshoots

USDA-ARS Invasive Plant Research Laboratory
3205 College Ave., Fort Lauderdale, Fl 33314

April 2004

Upcoming Events

Aquatic Weed Control Short Course 2004
May 3-7, 2004
Ft. Lauderdale, Florida
http://conference.ifas.ufl.edu/aw/

2nd Latin-American Short Course on Biological Control Weeds
June 7-10, 2004
Barcelo Hotel
Montelimar, Nicaragua

44th Annual Meeting of the Aquatic Plant Management Society
July 11-14, 2004
Tampa, Florida
www.apms.org

89th Annual Meeting of the Ecological Society of America
August 1-6, 2004
Portland, Oregon
www.esa.org/portland/

8th Conference of the International Society for Plant Anaerobiosis (ISPA).
September 20-24, 2004
School of Plant Biology, University of Western Australia
Perth, Western Australia
http://www.ibba.cnr.it/ispa/8th_conference/index.html

It goes without saying that the environment is always changing. Nothing, except maybe extinctions, illustrates that fact more clearly than the influx of invasive species. Florida has the second highest rate of introduced exotic species in the U.S., topped only by Hawaii. On average, Florida receives one new exotic species per month. The struggle to keep up with them is daunting. The IPRL is now involved in investigating a new insect pest, lobate lac scale, that has decided to call South Florida its home. Printed in the side bars in this report are some of the many known plants being attacked by the lobate lac scale world-wide. Read on...

John Scoles - Editor

Lobate Lac Scale

The lobate lac scale is a relatively new invasive pest in Florida, but it already has an enormous presence. The scale insect is killing trees and shrubs across southeastern Florida. No larger than a pinhead, this insect is poised to create big trouble – perhaps the most significant trouble yet for gardens and natural areas. This tiny insect does not discriminate between natural vegetation, landscaped shrubs, or commercial fruit trees. It congregates in large numbers and cloaks itself and its victims in black sooty mold. If left unchecked, the effects of lobate lac scale, like those of melaleuca, could ripple across ecosystems and compromise habitat quality for all wildlife.

Native to India (and Sri Lanka), it was first found in Broward County in 1999 by the Florida Department of Agriculture and Consumer Services. Some of the heaviest infestations remain in that county. By 2002, it had spread north to Lake Worth, south to Homestead, and west into the Everglades. Lobate lac scale also occurs in the Bahamas, where a recent survey found that two-thirds of plant species examined were infested.

This invasive pest has been found on over 250 plant species in Florida. Many important plants are highly

Lobate lac scale host plants:

akee (*Blighia sapida*)

allspice (*Pimenta dioica*)

atemoya (*Annona cherimola*)

Australian pine (*Casuarina equisetifolia*)

avocado (*Persea americana*)

Bahamas flame bush (*Hamelia cuprea*)

banyan fig (*Ficus benjamina*)

Bauhinia sp.

bay rum (*Pimenta racemosa*)

Bignay (*Antidesma bunius*)

black ironwood (*Krugiodendron ferrum*)

black olive (*Bucida buceras*)

black sapote (*Diospyros digyna*)

Brazilian beauty-leaf (*Calophylum brasiliense*)

Brazilian pepper (*Schinus terebinthifolius*)

Brunfelsia sp.

button mangosteen (*Garcinia prainiana*)

buttonwood (*Conocarpus erectus*)

carrotwood (*Cupaniopsis anacardioides*)

Ceylon gooseberry (*Dovyalis hebecaripa*)

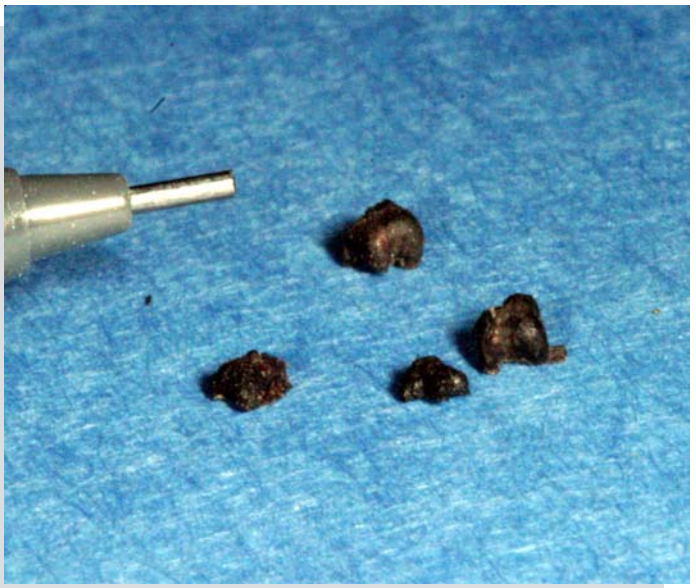
champaka (*Michelia champaca*)

cinnamon (*Cinnamomum zeylanicum*)

coastal plains willow (*Salix caroliniana*)

cocoplum (*Chrysobalanus icaco*)

susceptible, including native species such as wax myrtle, coco plum, red bay, wild coffee, and strangler fig, and commercially important species such as mango, ficus, lychee, and star-fruit. This widespread choice of hosts is what makes lobate lac scale particularly troubling. Evidence of their sap-sucking destruction includes blackened leaves and branches, branch dieback, and for susceptible species of shrubs and trees, death.



Lobate lace scale measures about 1/16"

Tiny specks on this stem are lobate lac scale

The best known member of the lac scale family (Kerriidae) is the true lac scale of Asia, and while humans have used the true lac scale since ancient times to produce shellac, the lobate lac scale has no commercial value.

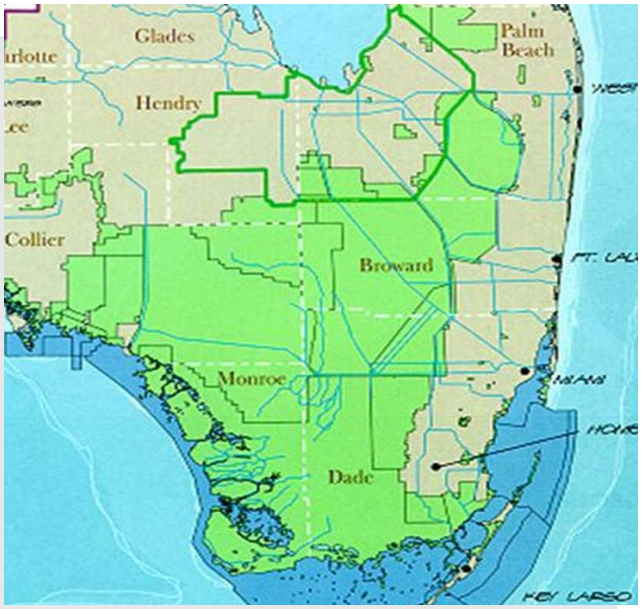
Lobate lac scales are dark brown but often appear dull black due to a covering of sooty mold. This mold also grows on the leaves of infested and nearby uninfested plants, feeding on the sugary waste excreted by the lobate lac scale. Measuring about 1/16 inch across, the adult lobate lac scale is visible to the naked eye, and looks like a tiny, four-lobed, 'X'-shaped, bump of bark. These hardshelled adults are usually surrounded by dozens of other such bumps. They are found

Sooty mold associated with lobate lac scale

primarily on thin woody branches less than one inch in diameter.

Adult females are immobile, but the red-colored larvae are not (no males have been found in Florida.) It is at the larval stage of their life cycle that the insects spread. The larvae, sometimes called crawlers, often move or fall to new sites on their host plants or nearby plants. While their spread is often aided by strong winds, much of their long-distance dispersal results from the actions of people, such as when a plant owner moves an infested plant from one location to another. You can help by not transporting any plants or plant material that you suspect of harboring lobate lac scale. Nurseries infested with lobate lac scale are quarantined until they are free of the pest.

A team of scientists, led by the IPRL's Dr. Bob Pemberton, is working to identify biological control agents for lobate lac scale. Financial support is provided by the Florida Department of Agriculture and Consumer Services. Because lobate lac scale is a relatively new pest, little research about it has been published.



Current distribution of lobate lac in South Florida

Certain insecticides are effective in controlling lobate lac scale on ficus trees but are not currently legal to use on most fruit trees. Horticultural oils are generally effective on scale insects, and work is underway to determine their effectiveness against lobate lac scale. Residents wishing to treat lobate lac scale infestations should contact their county's Cooperative Extension

Lobate lac scale host plants:

copperleaf (*Acalypha wilkesiana*)

copperpod (*Peltophorum pterocarpum*)

crape myrtle (*Lagerstroemia indica*)

custard apple (*Annona reticulata*)

duku (*Lansium domesticum*)

earleaf acacia (*Acacia auriculiformis*)

Elaeocarpus sp.
False mastic (*Mastichodendron foetidissimum*)

firebush (*Hamelia patens*)

Florida trema (*Trema micranthum*)

gardenia (*Gardenia jasminioides*)

golden shrimp plant (*Pachystachys lutea*)

grapefruit (*Citrus* X *paradisi*)

grumichama (*Eugenia brasiliensis*)

gumbo limbo (*Bursera simaruba*)

hibiscus (*Hibiscus rosa-sinensis*)

Indian laurel (*Ficus microcarpa*)

ingá doce (*Inga affinis*)

inkwood (*Exothea paniculata*)

jaboticaba (*Myrciaria cauliflora*)

Jamaica caper tree (*Capparis cynophallophora*)

Jamaican raintree (*Brya ebenus*)

Japanese fern-tree (*Filicium decipiens*)

Lobate lac scale host plants:

java-plum (*Syzigium cuminii*)

lady-of-the-night (*Brunfelsia nitida*)

lancewood (*Nectandra coriaceae*)

laurel oak (*Quercus laurafolia*)

lion's ear (*Leonotis leonurus*)

live oak (*uercus virginiana*)

lychee (*Litchi chinensis*)

Lysiloma sabicu

macadamia nut (*Macadamia integrifolia*)

macadamia nut (*Macadamia tetraphylla*)

manajú (*Rheedia aristata*)

mango (*Mangifera indica*)

marlberry (*Ardisia escallanoides*)

Mayan breadnut (*Brosimum alicastrum*)

miniature date palm (*Phoenix roebelenii*)

miracle fruit (*Synsepalum dulcificum*)

Mussaenda erythrophylla

myrsine (*Myrsine guianensis*)

myrtle-of-the-river (*Calyptranthes zuzygium*)

night-blooming jessamine (*Cestrum nocturnum*)

paperbark (*Melaleuca quiquenervia*)

pepperleaf sweetwood (*Licaria triandra*)

pink powderpuff (*Calliandra surinamensis*)

pitch apple (*Clusia rosea*)

pond apple (*Annona glabra*)

office (see http://extension.ifas.ufl.edu) for more guidance (including publication #EENY-276).

The best long-term solution for controlling lobate lac scale is using its natural enemies – a concept known as biological control. When plants or animals are introduced beyond their natural range, they are often without the associated complex of insects and diseases that normally controls their numbers.

Biological control involves determining what organisms attack the pest in its native range, testing potential biological control agents to ensure they attack only the targeted pest, and then releasing these agents into the non-native range. For the lobate lac scale in Asia, some natural enemies are tiny non-stinging wasps. The wasps have a very narrow diet, but before these natural enemies can be used in Florida, research must confirm that they eat nothing but the lobate lac scale.

The state of Florida has posted three lobate lac scale circulars online at:

http://edis.ifas.ufl.edu/IN471
http://creatures.ifas.ufl.edu/orn/scales/lobate_lac.htm

Dr. Bill Howard University of Florida	Cultivation of lobate lac scale and test scale insects
Dr. Ru Nguyen Forida Department of Agriculture and Consumer Services	Quarantine studies and safety testing
Dr. Bob Pemberton U.S. Department of Agriculture	Natural enemy acquisition Program Leader

http://www.doacs.state.fl.us/~pi/enpp/ento/paratachardina.html

Team of scientists working on lobate lac scale

TAME Melaleuca project holds two more demonstrations

On March 31st and April 1st, teams of contractors converged on two more demonstration sites for the TAME Melaleuca project. To mark breaking ground at these demonstration sites, Cressida Silvers, project coordinator for TAME Melaleuca, arranged for a number of local interested individuals to view the treatments as they happened.

The Corkscrew Swamp Sanctuary site is about 13 acres of privately owned land infested with melaleuca located adjacent to the Corkscrew Swamp Sanctuary in Collier County. The Lake Worth site is 2 acres of privately owned land in Palm Beach County.

Workers hacking and squirting melaleuca at the Corkscrew Swamp Sanctuary demonstration site

Both demonstration sites consist of various treatment plots marked off with flags and spray paint. Each plot was treated using a different control method, mechanical, chemical, or biological. Demonstrating these various control methods alone and in combination shows the importance of using an integrated approach to control melaleuca. These two sites show treatments as they would occur on residential property. No heavy machinery such as feller bunchers or Barko grinders was used.

Cutting melaleuca at the Lake Worth demonstration site

In addition to the small groundbreaking events held at these and earlier sites, the TAME Melaleuca team plans to hold regular, large-scale demonstration events at each site over the next few years. Watch for more information in upcoming reports. For more information on the TAME Melaleuca project, visit its web site at http://tame.ifas.ufl.edu.

Lobate lac scale host plants:

Pongam (*Pongamia pinnata*)

powderpuff (*Calliandra haematocephala*)

queen's crape-myrtle (*Lagerstroemia speciosa*)

queen's wreath (*Petrea volubilis*)

red bay (*Persea borbonia*)

red maple (*Acer rubrum*)

redberry stopper (*Eugenia confusa*)

Rheedia sp.

Rondeletia leucophylla

rose (*Rosa* sp.)

round kumquat (*Fortunella japonica*)

Ruellia sp.

rusty leaf fig (*Ficus rubiginosa*)

saffron-plum (*Bumelia celastrina*)

saltbush (*Baccharis halimifolia*)

sand live oak (*Quercus geminata*)

sapodilla (*Manilkara zapota*)

satinleaf (*Chrysophyllum oliviforme*)

soursop (*Annona muricata*)

southern red-cedar (*Juniperus silicicola*)

Spanish cherry (*Mimusops elengi*)

Spanish lime (*Melicocca bijuga*)

spicewood (*Calyptranthes pallens*)

star apple (*Chrysophyllum cainito*)

starflower (*Grewia occidentalis*)

Lobate lac scale host plants:

starfruit (*Averrhoa carambola*)

strangler fig (*Ficus aurea*)

strawberry guava (*Psidium littorale*)

sugar apple (*Annona squamosa*)

sugarberry (*Celtis laevigata*)

Surinam cherry (*Eugenia uniflora*)

sweet tea tree (*Melaleuca decora*)

sweetbay (*Laurus nobilis*)

Syzigium paniculatum

Terminalia muelleri

Texas ebony (*Pithecellobium flexicaule*)

Thai basil (*Ocimum* sp.)

tibig (*Ficus nota*)

tropical almond (*Terminalia catappa*)

violet tree (*Polygala cowelli*)

Virginia creeper (*Parthenocissus quinqefolia*)

wampi (*Clausena lasium*)

wax myrtle (*Myrica cerifera*)

weeping bottlebrush (*Callistemon viminalis*)

white stopper eugenia (*Eugenia axillaris*)

wild coffee (*Psychotria ligustrifolia*)

wild coffee (*Psychotria nervosa*)

wild dilly (*Manilkara jaimiqui*)

wild tamarind (*Lysiloma latisiliqua)*

willow bustic (*Dipholis salicifolia*)

willow leaf fig (*Ficus salicifolia*)

yaupon holly (*Ilex vomitoria*)

ylang-ylang (*Cananga odorata*)

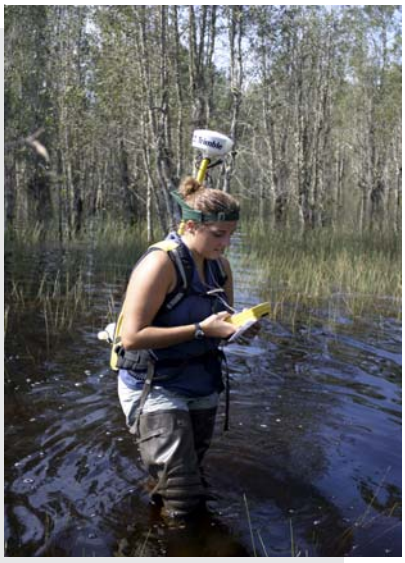
Picture of the Month

Early spring snow in Fort Lauderdale? No, this is flocculence, a sugary substance sucreted by the melaleuca psyllid.

IPRL says farewell to Robin Johnson

Using students at research facilities is a common practice. It is a win-win proposition: the students get badly needed practical experience and the research facility gets much-needed help with field work and lab work. There are currently seven interns and three student employees working at the IPRL. The interns come to the IPRL in cooperation with the Student Conservation Association (SCA) and the student employees are here as part of the Student Temporary Employment Program (STEP).

Robin Johnson has spent the last year working at the IPRL. While she was here she worked for Dr. Paul Pratt on the TAME Melaleuca project. Robin was instrumental in preparing the TAME Melaleuca demonstration sites for treatment. She is now heading off to graduate school at Michigan Institute of Technology.



Robin Johnson seen with her seemingly constant companion, aTrimble GPS unit, on her back.

Photo by Scott Wiggers.

Dr. Ted Center
Research Leader
tcenter@saa.ars.usda.gov

Scientists

Dr. Ted Center
tcenter@saa.ars.usda.gov

Dr. Steve Franks
sfranks@saa.ars.usda.gov

Dr. Robert Pemberton
bobpem@saa.ars.usda.gov

Dr. Paul Pratt
prattp@saa.ars.usda.gov

Dr. Min Rayamajhi
minray@saa.ars.usda.gov

Dr. Philip Tipping
ptipping@saa.ars.usda.gov

Dr. Thai Van
thaivan@saa.ars.usda.gov

Dr. Greg Wheeler
wheelerg@saa.ars.usda.gov

Support Scientists

Dr. F. Allen Dray
fadray@saa.ars.usda.gov

Paul Madeira
ptmadeira@saa.ars.usda.gov

Cressida Silvers
csilvers@saa.ars.usda.gov

Chris Bennet
caben@gnv.ifas.ufl.edu

Susan Wineriter
tmozart@nersp.nerdc.ufl.edu

IRPL Offshoots Editor

John Scoles
jscoles@saa.ars.usda.gov

Technicians

Carl Belnavis
Robyn Chiarelli
Willey Durden
Luke Kasarjian
Jorge Leidi
Rosa Leidi-Ferrer
Kelly MacDonald
Reynaldo Moscat
Eileen Pokorny
Jenna Scheidegger

Administrative Staff

Geri Barber
gbarber@saa.ars.usda.gov

Sue Keusch
skeusch@saa.ars.usda.gov

Student Conservqtion Association (SCA) Interns

Lisa Brutcher
Karen Bussey
Chris Greishop
Melissa Martin
Shannon Morath
Scott Wiggers

Student Temporary Employment Program (STEP)

Donna Bann
Sigfredo Gonzalez
Jennifer Palacio

USDA-ARS IPRL
3205 College Ave.,
Fort Lauderdale, FL 33314
Tel: 954-475-0541
Fax: 954-476-9169

Web Sites You May Want to Visit

To learn more about invasive plants and what various organizations are doing about them visit the following sites on the internet.

Agricultural Research Service
www.ars.usda.gov/

Center for Exotic and Invasive Plants
plants.ifas.ufl.edu

Federal Noxious Weed Program
www.aphis.usda.gov/ppq/weeds

Florida Department of Agriculture, Department of Plant Industry
www.doacs.state.fl.us/~pi/index.html

Florida Department of Environmental Protection, Bureau of Invasive Plant Management
www.dep.state.fl.us/lands/invaspec/

Florida Exotic Pest Plant Council
www.fleppc.org

Invasive Plant Research Laboratory
www.weedbiocontrol.org/

The National Agricultural Library's Invasive Species website
www.invasivespecies.gov

South Florida Water Management District
www.sfwmd.gov

Southwest Florida Water Management District
www.swfwmd.state.fl.us/

Student Conservation Association
www.thesca.org

TAME Melaleuca Project
http://tame.ifas.ufl.edu

The Nature Conservancy
http://nature.org/

Previous reports are available online at:
http://tame.ifas.ufl.edu/html/publications.htm

***IPRL* Offshoots**

USDA-ARS IPRL
3205 College Ave.,
Fort Lauderdale, FL 33314
Tel: 954-475-0541
Fax: 954-476-9169